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Normal Creativity: What 1,038 t-shirts can tell you about design education

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Abstract: *The study of creativity in design has tended to emphasise its value, scarcity, and location in the individual designer rather than in choices made by a consuming public in the context of a wider culture. This paper, in presenting and developing a view of creativity in design as a normal concept, will present initial results from a study of 1038 student design assignments obtained from a distance-learning course in Design Thinking from The Open University in the UK. We show how ‘normal’ distributions of design outputs can be contived from a structured design process and argue that the creativity that is displayed is a natural result of the ‘grammar’ of that process, in a similar way to the syntax of a sentence allowing new combinations of words and meanings to be easily formed. Seen like this creativity is less of an individual ‘gift’, as some theories imply, but a common everyday response to open-ended problems.*

Keywords: *Creativity, assessment of creativity, originality, design process, design education, design assessment.*

1. Introduction

The study of creativity in design has tended to emphasise its value, scarcity, and location in the individual rather than the wider culture. The idea of the ‘creative genius’, central to Enlightenment thinking, has cast a long shadow over our understanding of creative ability and led us to treat it more as a ‘gift’ than as a natural result of human diversity. This has been especially so in work looking at fine art, musical composition, scientific discovery, invention, and other areas where key moments of insight and outstanding technique were considered to have an element of magic about them. Poincaré’s four stage model of creativity – preparation, incubation, illumination, verification – presented as a description of the creative process in the early 1900s, only served to reinforce this idea, with individuals operating in different

disciplines readily using it to describe their own work and tacitly, or perhaps explicitly, propagating the idea of their own genius. There has been a body of work criticising the idea of 'sudden genius' (Robinson 2010) but studies of creativity (Mackinnon 1965; Sternberg 1991) have generally tended to focus on individuals qua individuals in explaining its nature and origin.

There are, however, more complex and alternative views of creativity that place emphasis on it being a more social and commonplace process (Coyne 1997), an effect of expected cultural types combined with a diverse population. In this respect, a more structuralist explanation based on grammars of creation (Steiner 2002) is an interesting development of Chomsky's famous sentence 'colourless green ideas sleep furiously' (Chomsky 1965) which illustrates that humans can be effortlessly creative if an appropriate grammar of production and understanding exists; we have no problem in creating sentences that we've never said before. Indeed there is evidence to suggest that just by telling people to be creative, when they are asked to solve open-ended problems, results in a more creative outcome (O'Hara and Sternberg 2001).

Applying these theories of creativity in education occurs largely at an instinctual level – that is, it will largely be the beliefs of the teacher that will be expressed explicitly and implicitly. A teacher who believes in a normative view of creativity will respond differently to those who might adopt a structuralist or relativist approach. The importance of the teacher's own perceptions of creativity are critical in the fostering (or stifling) of creativity in students (Craft 2006). In design education in particular, many of the prejudices and opinions we form as designers are transferred to teaching – whether these are explicit or implicit. One key example of this is the definitions we form of creativity and the assumptions we make about its articulation and operation.

Originality and divergence from expected norms are often cited as essential aspects of creativity – after all, what value might we derive from a solution that already exists? But in education, this must be tempered by the fact that *individual* creativity is the ability we wish to develop, an important aspect of the investment theory of creativity (Sternberg 2012). Educators would hardly call a five-year-old child uncreative for drawing a house with four windows and curly smoke coming from the chimney. To do so would be to significantly impede the progress of creative processes – drawing from imagination, communication, projection, representation, etc. This lies at the heart of Craft's notion of using 'wisdom' when considering creativity (Craft 2006).

A new Open University distance learning course in Design Thinking, launched in 2010, the details of which are described elsewhere (Lloyd, in press; Jones and Lloyd, submitted to this conference) provided us with an opportunity to look afresh at the idea of creativity in relation to design. The Open University has a unique demographic among universities, being a provider of distance learning. Students of all ages study with the Open University, with a particularly high proportion of mature students; almost all students study part-time, and many work in full-time jobs across a wide range of professions. Furthermore, as the university doesn't require any previous level of qualification, students often have little experience of study in further education, and often low levels of confidence. This contrasts greatly with most conventional universities (and most universities where studies in creativity are carried out with students as participants) where first year design students often have existing creative qualifications, tend to come from a similar age group, and have shared values and backgrounds.

To some degree, then, the population of first year Open University students might be considered more demographically 'normal' than a first year cohort in a conventional

university, certainly in terms of age and providing a broad cross-section of society. That has provided us with a unique opportunity to study creativity in design from a slightly different, perhaps more naïve, perspective in determining what ‘normal’ creativity might look like. To date, over 2000 students have studied the Design Thinking course and that number, together with the fact that students all have to submit their work online, to the same format, presents an opportunity for a large scale analysis of the work they have produced.

This paper presents results from an exploration of data regarding a design assignment to design a T-shirt. We first describe the ‘participants’ in the study, 1038 students whose T-shirts were looked at. We then describe the design task and lay out our method of analysis, before presenting the results in a number of bar graphs that deliberately contrive normal population distributions. We have used the data generated, and the means of generating it, as a tool to consider more philosophical questions about the nature of creativity in terms of its production and consumption. Our central question, however, has been to find out what creativity might look like, or how it can best be represented, across a large population of design students.

2. Method

2.1 Participants

Students from three cohorts of the first undergraduate level Design Thinking course (U101) were treated as participants in this study. 314 students completed the course in 2010, 493 in 2011, and 272 in 2012, making a total of 1079 students who had submitted a T-shirt for their first design exercise.

Across all cohorts, 47% of these students were female, and 53% male. The average age was 30-39, with an age range from 16 to over 65. 12% of students had a registered disability. For 40% of students, U101 was their first Open University course (‘new students’), while 60% had studied other courses at the Open University (‘continuing students’). A proportion of students had experienced some kind of creative education, some in higher education, though the majority had not. The vast majority of students (more than 95%) studied the course part-time.

2.2 Task

Students studying U101 receive a creative welcome pack in the post, containing (amongst other things) a white T-shirt and a sheet of A4 T-shirt transfer paper – see Lloyd (in press) for further details. These are used for their first design assignment of the course, completed over a three week period, 5 weeks after course start. The three week assignment follows a prescribed design process (shown in figure 1) with an exploration phase, a concept phase, a detail or proposal phase, and an evaluation phase. Students record their activity in each phase, and add it to the ‘nodes’ of Figure 1 using the specially created software environment CompendiumDS.

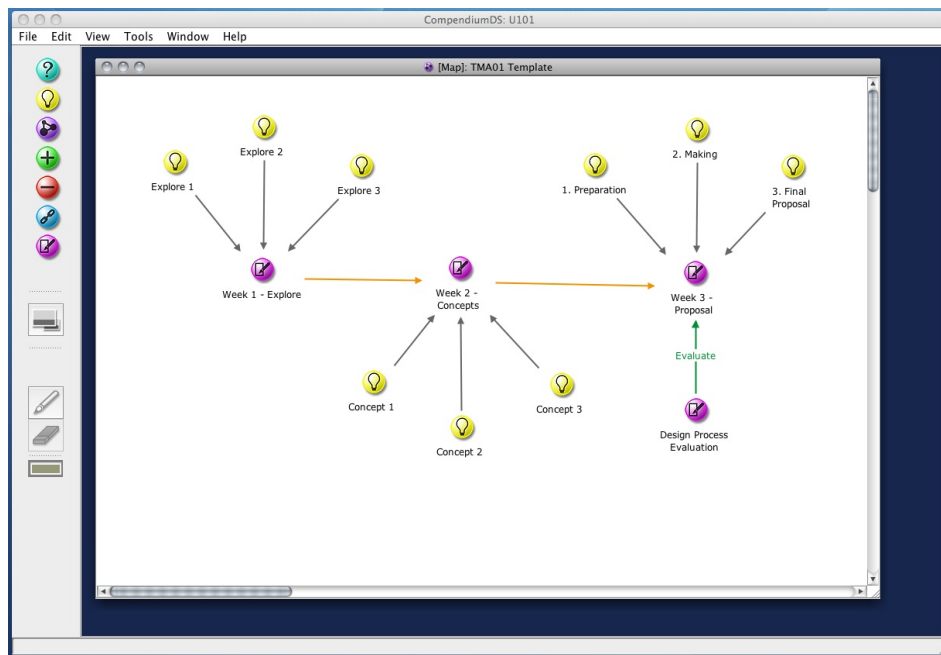


Figure 1. The design process for the T-shirt design task. Students record their activity with images and text and add these to the nodes of the figure during four phases of design: exploration, concepts, details, and evaluation. Each phase consists of three alternative directions.

The overall task in creating a T-shirt is to use the hand as an inspiration, and tracing around photos as a method of drawing. For the exploration phase students are asked to consider: (i) a particular aspect of their hand, (ii) a story about their hand which might involve a particular object, and (iii) a gesture that they make with their hands. For each aspect they are asked to take a photo. Figure 2 shows an example photo that students are shown for part (i) of this phase.

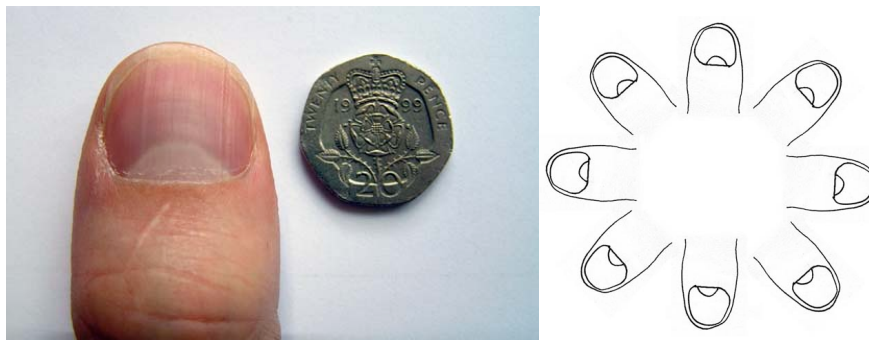


Figure 2. Example images for the 'observation' concept source: a photo of a thumb (left), and pattern derived from tracing the image (right).

In the concept phase students are asked to take each of the photos they produced in the exploration phase, trace round them on paper, and then develop each one in simple ways – with (i) pattern, (ii) colour, and (iii) text. Figure 2 shows an example that students are shown for part (i) of this second concept phase.

In the detail phase, where the students make their design proposal, they are directed to choose their favoured concept and develop it further before they print it on to the T-shirt transfer paper and transfer it to their T-shirt. One of the ways in which further development is suggested, if students are having trouble choosing, is by combining concepts from the second phase of their design process. Once printed the students transfer their design on to their T-shirt with a hot iron and then complete a final design process evaluation.

Once all phases are completed and their design activity added to the nodes of figure 1, students then submit their CompendiumDS 'maps' for assessment. During their design process students use an online design studio and portfolio, and when they have finished their T-shirt assignment they upload a photo of it into their portfolio. This photo is available for all other students (and tutors) to view once it has been uploaded, which is not necessarily after the cut-off date for the assignment. The assignment is assessed on their design process, not on the quality of their T-shirt outcome.

2.3 Analysis

Our analysis centred solely on the T-shirt outcomes that were produced from the design task. In thinking about how to analyse these we decided on two types criteria: objective criteria related to both the task and the classification of the T-shirts; and subjective criteria related to the quality of the T-shirts themselves. This provided us with a corpus of data reflecting production, output, and consumption, our underlying theory being that 'creativity' resides in some combination of these things.

For the main objective criteria we classified T-shirts by:

- Concept source (observation, story/object, gesture, unknown)
- Centre placement (yes, no)
- Multiple transfers (yes, no)
- Use of text (yes, no)

T-shirts were further broken down in the 'concept source' categories of 'gesture' and 'story/object':

- Type of gesture
- Type of object

Figure 3 shows examples of T-shirts from the four concept source categories. Figure 4 shows examples of all eight yes/no combinations of centre placement / multiple transfers / use of text.



Figure 3. Example T-shirts showing concept sources: observation (top left), gesture (top right), story/object (bottom left), unknown (bottom right).



Figure 4. Example T-shirts illustrating every combination of centre placement (Y/N), multiple transfers (Y/N), and T-shirts containing text (Y/N). Clockwise from top left: NYN, NNN, NYY, YNY, YNN, NNY, YYY, and YYN.

For the subjective criteria we classified T-shirts on one quality dimension:

- Would you purchase the T-shirt? (potentially, maybe, probably wouldn't)

An initial selection of 25 T-shirts was collated to pilot the classification criteria with two raters (the authors of the paper) and to discuss their relevance in the light of example T-shirts. Good agreement was obtained for the concept source category though some development of definition was required.

A pre-selection menu of 10 popular gestures was made for the gesture sub-category, with an 'other gesture' option provided along with a further gesture description field. No pre-selection menu was set for the story/object sub-category, but a description field was provided.

Excellent agreement was obtained for the 'centre placement', 'multiple transfers', and 'use of text' criteria so these were unchanged. There was some disagreement in the subjective criteria of quality. This was as expected, due to differences in taste, but the category wording was amended to provide a subtler gradation in quality rating ('potential purchase', 'maybe', 'probably wouldn't purchase'). From the pilot, three categories were thought to be a sufficient discriminator of both the quality of T-shirts, and of rater taste.

A total of 1038 T-shirts were classified, 500 by rater 1, and 636 by rater 2. This meant that 102 T-shirts were classified by both raters, providing further data about rater agreement. Both raters had, over the three years of the course, some familiarity with a small proportion of the T-shirts, but this was not thought to present significant problems to rater objectivity.

3. Results

3.1 Rating agreement:

Table 1 shows the level of agreement obtained between the raters for the 102 T-shirts that were rated by each rater.

Table 1. Rating agreement for T-shirt rating criteria.

Rating Criteria	Level of Agreement
Concept source	73.5%
Centre placement	89.2%
Multiple transfers	96.1%
Text	92.2%
Quality	44.1%

The criteria of concept source had slightly less agreement than was expected. On further analysis there was a 17.7% difference in interpretation (where raters could agree to either rating category) and 8.8% attributable to either genuine disagreement or a category error. Agreement about quality, at 44.1% was in line with expectations as well as the results from the pilot study. Three ‘potential purchases’ were agreed upon and these are shown in Figure 5.

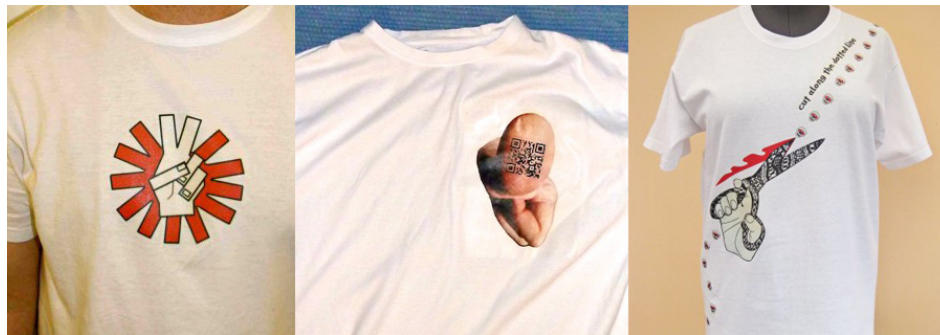


Figure 5. The three T-shirts out of a sample of 102 where both raters agreed with the judgement ‘potential purchase’.

3.2 T-shirt classification

Figure 6 shows the distribution of T-shirts by concept source. The expectation had been for a relatively even distribution between concept sources, but Figure 6 clearly shows just over half the T-shirts deriving from the ‘gesture’ category. The potential fixation effect of showing images relating to the ‘observation’ category (Figure 2) appears not to have resulted in a choice for that concept source. This is an important finding for the continued use of this as a formative and summative assessment – we are now able to confirm that students, on the whole, are not fixating on examples given in the assignment description.

The choice of gesture might be due to apparent simplicity – especially in photographing and tracing – but it is not obviously easier than other concept sources. One possible explanation might be to do with student confidence, where the perceived need to communicate their idea may play an important role. By using symbol, gesture or text as a familiar element of language, students might be relying on these familiar modes of communication to gain confidence in representing their ideas in an unfamiliar environment.

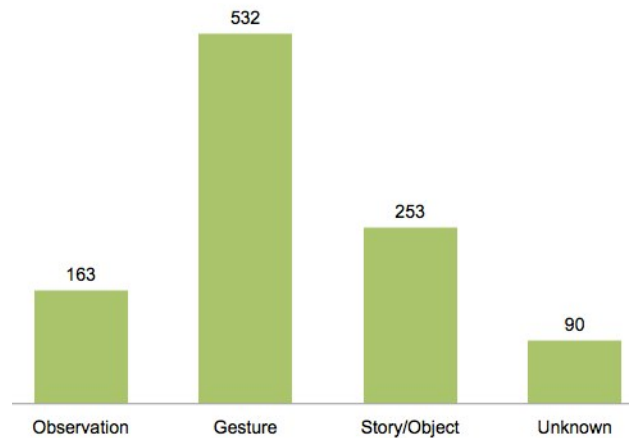


Figure 6. Distribution of T-shirts by concept source

The 'type of gesture' sub-category is broken down in Figure 7, for all 532 T-shirts choosing gesture as a concept source, and where the gesture count was greater than 4. The expectation was that 'thumbs up' and 'ok' gestures would be most popular, but the range of gestures (88 in all) was a surprise. Gestures that we had preselected for categorisation did prove among the most popular though gestures figuring in the 'other gesture' category, notably a heart and animal shape made with the hands were equally as popular.

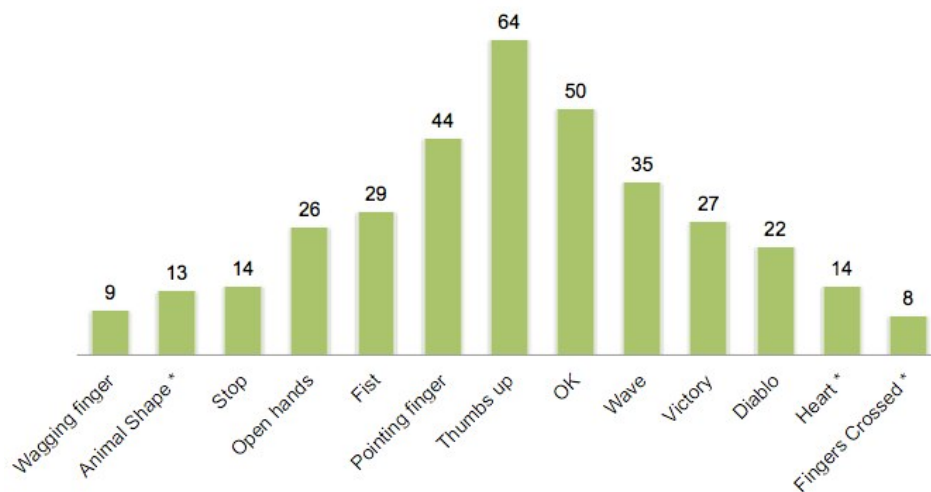


Figure 7. Breakdown of different gestures in the 'gesture' concept source. *denotes gestures that were not in the original pre-selection for raters.

The second most popular concept source was story/object and the most popular objects that were used in the T-shirt designs, scoring a count of more than three, are broken down in Figure 8. We had expected that pens and pencils would figure prominently, but we hadn't expected the guitar to be quite so popular. Figure 8 indicates that object examples were proportionally less popular than gestures (i.e. the

most popular gesture was just over three times as popular as the most popular object), and the range of objects depicted much wider (132 in total). What was a surprise was how natural and obvious objects seemed once they were seen, although being difficult to predict in advance.

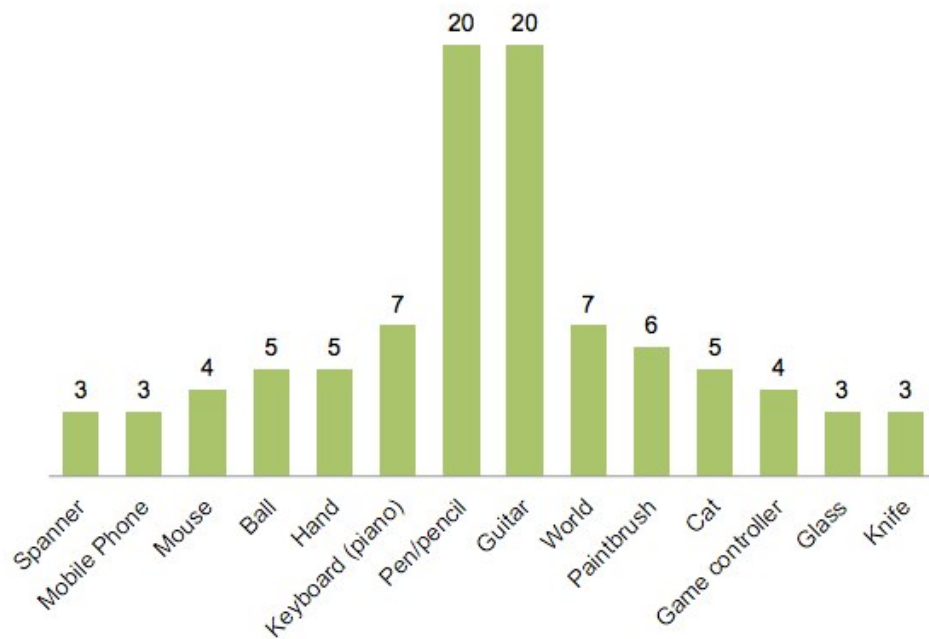


Figure 8. Most popular objects for the story/object concept source.

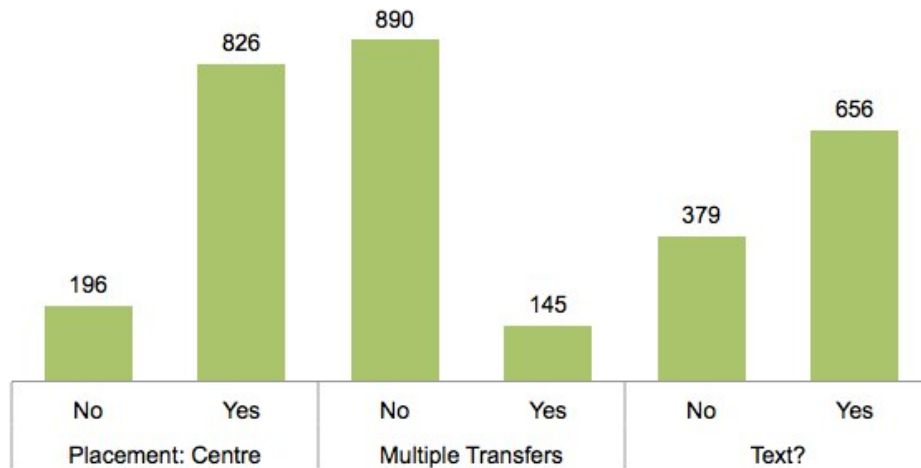


Figure 9. Distribution of T-shirts by centre placing (left), multiple transfers (middle), and T-shirts containing text (right).

Normal Creativity: What 1,038 t-shirts can tell you about design education

Figure 9 shows the raw distribution for the 'centre placing', 'multiple transfers', and 'use of text' criteria, with Figure 10 showing the distribution of all combinations of these criteria.

Our assumption was that centre-placement and one transfer would be the norm, with a preference for the use of text, and this was borne out in the data (the YNY category). One central motif on a T-shirt with or without text is by far the most popular means of presentation for T-shirts on the market, so it was no surprise to see student T-shirts reflecting this. What is perhaps surprising is that 24% of T-shirts, one in four, deviated from this norm. It may be possible that students, too, realise this and deliberately choose solutions that obviously express this deviation, believing that 'different is creative'.

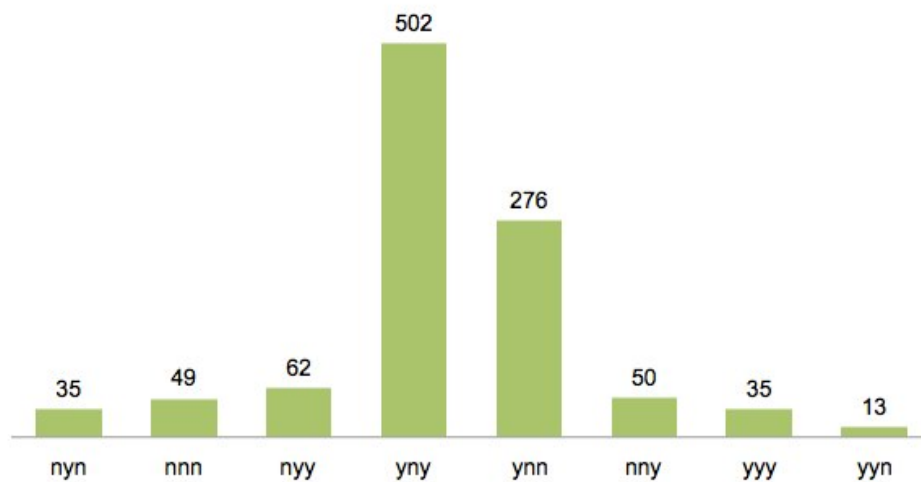


Figure 10. Percentage distributions of all combinations of centre placement, multiple transfers, and T-shirts containing text.

Finally, figure 11 shows how the two raters compared in their judgements about whether or not T-shirts were potential purchases. Overall rater 2 tended to like more T-shirts than rater 1, categorising 58% in the 'potential purchase' and 'maybe' categories against rater 1's 38%. Both raters recorded similar levels of 'potential purchase' judgements however, 12% for rater 1 and 16% for rater 2, roughly 1 T-shirt in 7 for both raters. This might indicate some kind of tacit expectation on the part of raters that achieving a certain threshold quality should be uncommon, but not rare. The ratio of 1 to 7 appears appropriate in that respect.

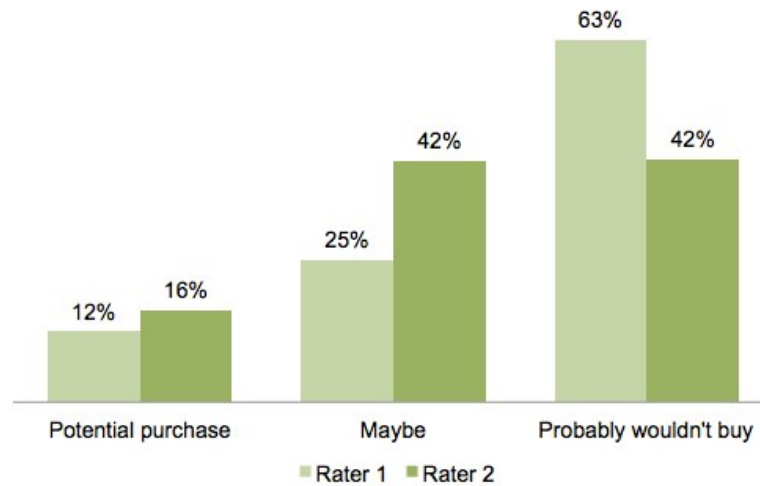


Figure 11. Judgments about T-shirt quality by rater.

4. Discussion

The results as presented provide a snapshot into a student population that we have argued is more 'normal' than most design student populations. Obviously students self-select to study a course in design, so the student population presented here could not be said to be representative of the population as a whole, but there is an argument that they better represent the demographic of the general population than do many other courses in design, particularly in terms of age, general qualification, and vocation.

We started the paper by contrasting two views of creativity. One view considered creativity as some kind of 'gift' while the other view considered creativity more as a commonplace activity; a human response to being set a structured but open-ended problem. Clearly the data reveals that there are differences in the quality level that students achieve, which would indicate varying levels of ability and the possibility that some students have more of a 'gift' than others. What we think the data shows is that 'the gift', whatever that is, is normally distributed. Some students have a lot of the gift, perhaps as a result of previous experience, while some have less of the gift, perhaps those new to creative work. But in completing their T-shirts, and with a task that takes out what students consider to be specialist design skills like drawing, all students demonstrated creative ability at some level.

The idea of creativity as a normal thing is reflected in the deliberately contrived way in which we have presented our analysis as distributions of data. Figures 6, 7, 8 and 10 can all be interpreted as a kind of bell curve, a classic distribution of a normal population, though this is merely a presentational choice for discrete data – there is no defined independent variable in these graphs. Rather, the graphs show that there is a stable preference for certain forms and ideas and that a 'norm' can be projected on to the data, although even when considering a popular idea like the 'guitar' object the range of responses, in terms of quality, belies that classification. Normal, in this instance, seems to be much more of an expectation for the people rating the work.

The second view of creativity, and the kind of explanations it implies, seems, in our view, to account for the data much more comprehensively. For example, the task we gave had a predefined 'grammar' to it; a prescriptive process that students couldn't

help responding to creatively. In this sense creativity is the natural outcome of committing to a defined process, and the course provides the necessary framework for that commitment. Indeed, one of the most popular comments from students, to the extent that it became commonplace for tutors marking their work, was that they didn't realise that they were capable of achieving what they produced.

Among many comments are those that show surprise at how much creativity can be generated from such a simple exercise and it is this very simplicity of structure that provides students with the opportunity to generate such variation. By providing a clear, activity-based design process, students are able to 'trust' the procedure but at the same time diverge in their thinking along a number of routes. Students consistently raise concerns prior to this assessment about their artistic abilities and lack of imagination. At the end of the activity they are beginning to realise that it is the act of making as thinking (doing) and trust in the process (committing) that really matters.

In terms of task there are some possible effects that need to be taken into account. The first is the use of an online design studio where students could upload images and photos of the T-shirts they were working on, as well as including an image of their final design at a point before the official assignment cut-off date. What happens in this space (see Jones and Lloyd, this conference) is social; students see the completed work of others and have these outcomes available as exemplars for their own work – in terms of method, technique, or more generally as inspiration. That means that students, unsure of their own 'creativity' and what to do, draw on the work of others. Such a mechanism could have several potential effects. Overall, it may drive up quality – however we define that – but there is also a possibility of fixation and, on a larger scale, a coalescence to a more restricted norm. It could, of course, have the opposite effect. Students may deliberately position themselves against what they see by, for example, choosing different placements and numbers of transfers for example. If both effects were the case, they would tend to cancel each other out, but this social aspect to the task should be noted. In relation to the two views of creativity, online activity could be argued both ways. Students might orient themselves to what they perceive as 'gifted' students, reinforcing the aura of individual genius; equally they may draw succour from the sheer numbers and variations they perceive in thinking of themselves as 'normal'.

The influence of the raters is another factor to take in to account. The categorisation scheme we developed had both objective and subjective elements to it and in piloting the scheme we were aware of some differences, particularly in the 'concept source' category, that then needed further definition and examples for clarification purposes. The data in the final study, although having less agreement than the more objective criteria of positioning, multiple transfers, and use of text, was thought to be good, particularly for an initial exploration of the data. Were we to obtain independent raters to categorise the T-shirts in developing this study it would be interesting to see the level of agreement. Ideally we would also have liked to have categorised all T-shirts by two raters, rather than a sample of 10%. Time was a factor here, and is also something that would be addressed in developing this study further.

The disagreement in judgments about quality was expected, and would be expected in further study. What was interesting was the broad agreement of the 1 to 7 ratio for identifying T-shirts as potential purchases. That figure would be used as a hypothesis in a further study to determine whether it applied more widely, to other people assessing a large number of creative objects of a type, and with varying experience of design. The idea that we 'expect' to be drawn to 14% of the things deriving from a creative task

seems to balance out a need to experience novelty against a need for rough similarity. Creativity, then, could be said to lie more with the consumer who chooses the T-shirt, rather than with the designer whose task, in this formulation, is to provide novelty around the top of the bell-curve – ‘most advanced yet acceptable’ in Raymond Loewy’s phraseology (Loewy, 1951). There are various ways of achieving that. One is by presenting a surprising idea, but more often than not factors like quality of detailing, presentation of image, and even the type of model, played a role in the purchasing decisions of the raters. That won’t be a surprise to anyone familiar with the marketing literature, but it does diminish the ‘creativity as a gift’ view. The point for design education is that these things can be taught, and easily taught. We have not attempted to teach students about creativity in their T-shirt task, rather we have assumed that creativity will take place in teaching them about the process of design.

This is the irony of the idea of creativity as originality – it relies on a ‘normal distribution’ in order to identify the outliers. Just as we as individuals rely on the society and context within which we live to construct who we are, the creative object also relies utterly on those objects around it to provide contrast. The prejudices we all hold towards creativity are then projected and expressed in the distribution of ‘normal creativity’.

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